the facts of nature really are as here represented, the gaining of this new point of view must be regarded as a distinct advance in this adaptation.

From the above unsatisfactory [1] sketch of Professor Mach's position, it may perhaps be seen that he regards a great psychophysic movement in science as the next revolutionary process. Many signs of such a movement are already evident.

J. J.

A MANUAL OF NORTH AMERICAN BUTTERFLIES.

ALTHOUGH a really good manual of our butterflies has long been a desideratum, Morris's Synopsis being altogether out of date, it cannot be said to be supplied in the present work.

The whole aim of the author seems to be to enable his reader to find out the name of a specimen in hand; and to this end his 'analytical key' is fairly good, so far as the perfect insect goes, excepting, that as no tables are given for genera, families, etc., it would not help the student if species not included in the book were to turn up. The key is also faulty, because largely made up of very unimportant characters, and because it takes no account of the earlier stages; indeed, no means whatever are anywhere furnished for finding out the affinities of a caterpillar or chrysalis in hand, except by wading through all the descriptions in the book.

We fail to see how the work can be of any possible pedagogical service, although this is claimed as its chief end. For, first, the only clew it gives to the classification, i.e., the natural arrangement of butterflies, is in the brief statement that is presented of the characters of some of the higher groups, and, incidentally, in the actual arrangement of the species treated; there is scarcely a reason suggested why the sequence of the groups should be as it is; it is simply stated in the preface that Edwards's arrangement is followed, yet Edwards has never offered a reason, but only printed a bare list. Second, the arrangement itself is unnatural, holding its ground only through precedent, as a legacy from the less-informed authors of fifty years ago. Third, the whole aim of the author appears to be to enable the user to answer the question, 'What is the *name* of my butterfly?'— for pedagogical purposes not even a worthy, far less the best end.

The genera are nowhere characterized; the descriptions of the butterflies could be much improved by more concise and methodical expression and the italicizing of the most distinctive features; the early stages of a considerable number of species are omitted, when they have been known and published for many years; and, finally, there is not a line or suggestion throughout the book which would lead one to suspect that science had changed within the last eventful quarter-century. It is but the rehabilitation of the dry husks of a past generation.

[1] The account is perhaps unavoidably so; as it was the task of the reviewer to avoid the technicalities of the psychological part on one side, and of the physical part on the other.

The butterflies of the eastern United States, for the use of classes in zoölogy and private students. By G. H. FRENCH. Philadelphia, *Lippincott*, 1886. 12°.

SCRANTON is the centre of what is known as the northern anthracite coal-field of Pennsylvania, comprising nearly two hundred square miles. Using this fact as a fulcrum, and taking for a lever the fact that natural gas has to a great extent displaced coal in Pittsburgh, the Scranton board of trade are endeavoring to lift their home into prominence as one of the great manufacturing cities of the future. In a neat pamphlet recently published by the board, it is pointed out that gas is a more economical fuel than coal; that the supply of natural gas will soon be exhausted; that there are forty million tons of culm, or coal-waste, — which may be had for the taking, — lying about the mines of the Scranton region; that this amount is being increased by two million tons annually; that gas may be made from this waste at a cost of two cents per thousand feet; that in the near future coal will probably be converted into gas in the mines, and piped to the surface; that gas-engines are steadily growing in favor; and that Scranton is already a great railway centre, with excellent shipping facilities to all points of the compass. The conclusion is inevitable, at least to the publishers of the pamphlet, that Scranton is a very desirable place for the establishment of industries requiring cheap fuel and power.

— An experiment with a new hydro-carbon fuel burner for locomotives was recently tried on the Third Avenue elevated railroad in this city. The burner is about six inches in length by five in diameter. A spray of petroleum and steam was forced through perforations in the burner, producing a large volume of flame; but, through inability to control the draught of the furnace, combustion was imperfect, and the experiment was a failure. This was only one of a long series of experiments with similar devices, none of which has succeeded. As the consumption of coal on the locomotives of the elevated railroads averages only two and six-tenths pounds per horse-power developed, there would seem to be no field for the economic substitution of petroleum at present prices.